On FIRE-MAKING *in* NORTH BORNEO.

By SYDNEY B. J. SKERTCHLY, F.G.S., M.A.I.

[WITH PLATE XI.]

I.—Introductory.

THE following notes do not describe any new method of obtaining fire, but they are offered as exact accounts of the processes now in use, and I believe such accounts are as rare as they are useful. Moreover the rapid spread of matches is steadily replacing the aboriginal methods even among the tribes in the interior of Borneo, who get them from Chinese and Malay traders.

The apparatus sent herewith was all made by my own Dyaks or Cagayau-sulus, and the photographs which accompany the paper are of the makers, taken by my wife. I have seen each specimen used successfully by my men, and more or less unsuccessfully by myself. In the forest I have more than once been reduced, about dinner-time, to the fire-drill.

The orthography of the Dyak words is phonetic. The information was conveyed to me in the Malay language, and I have no Dyak vocabulary.

I may here note a curious expression showing the Malays still class fire as an imponderable. A man will say:—

Kayu ini jahat, tá bulli kluah api.
Wood this bad, not will *exude* fire.

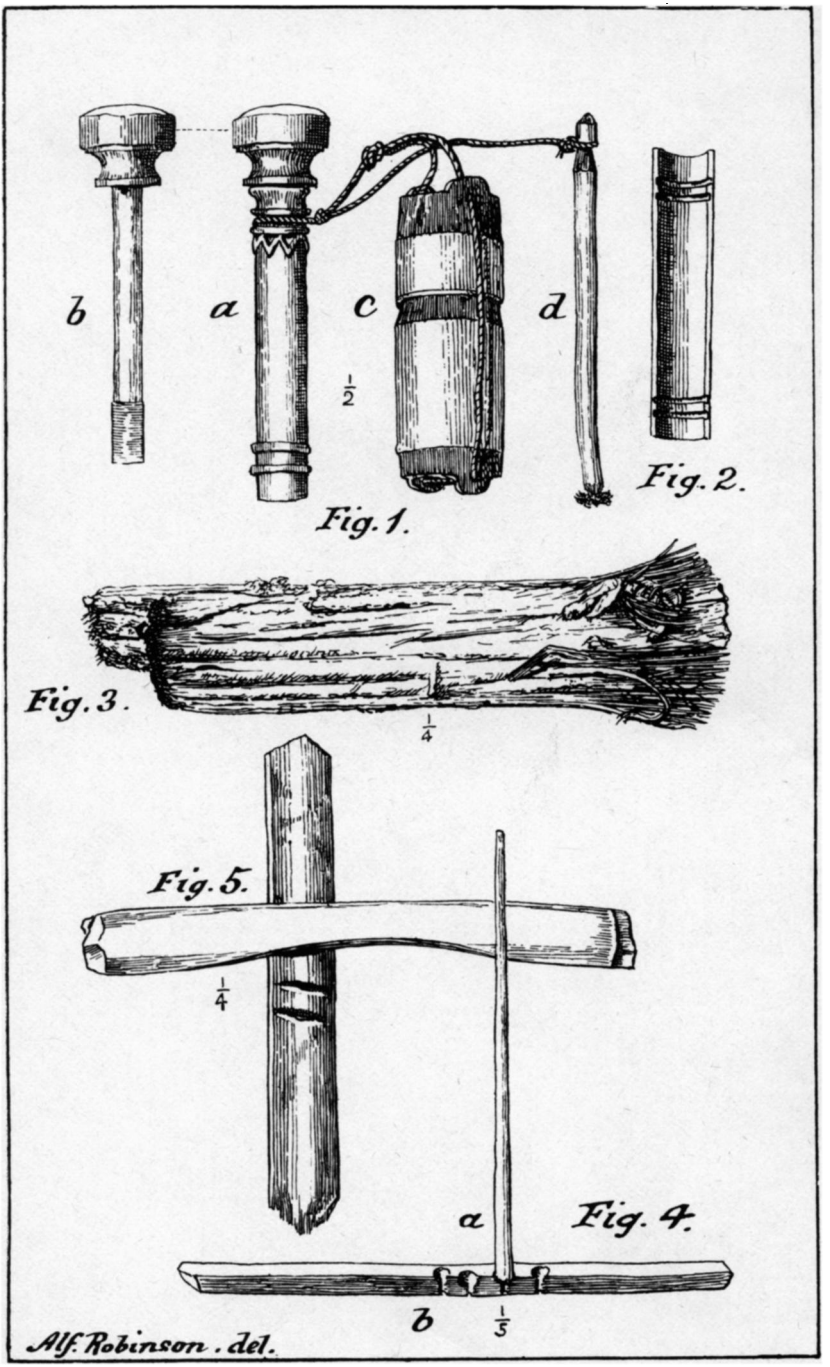
The verb *kluah* is noticeable as showing they believe the fire to reside in the wood. As a Malay elegantly expressed it—

Ini kayu ada api didalam, seperti bisul nanah.
The wood has fire inside, just as a boil [has] matter.

II.—The Fire-Syringe. (Pl. XI, fig. 1.)

The Dyak name is *Besi api bangka;* the Malay *Besi api timah.*

The literal interpretation is iron-fire-tin. *Besi* (pr. *biissi*) is "iron," and *api* "fire," in both languages. *Bangka* is "an ingot of tin" in Malay and "tin" in Dyak. *Timah* is "tin" in both languages.



FIRE-MAKING INSTRUMENTS FROM NORTH BORNEO.

Why the word *besi* is used seems difficult to explain, as no iron enters into its construction. I can only suggest it may be an abbreviation of *tukol besi*, "a hammer," literally "an iron-striker," in which case the name would signify "tin-fire-hammer." In common discourse the machine is simply called *besi api*. I do not think the apparatus was ever made of iron, as the Dyaks do not cast hollow things in iron, nor do I think *besi* can be a Dyak word with a meaning unknown to me.

The fire-syringe is by no means commonly known, and I asked many Dyaks[1] before I found any who could make, or even describe one. Finally some Kalakas helped me and made the specimens described. The Kalakas come from the west of Sarawak, the tribes in order going west from Sarawak being the Batang Lupa, Seribas, Kalaka, Batang Rejang.

The parts of a fire-syringe are named as follows:—

English.	*Dyak.*	*Malay.*
Cylinder.	Bangka.	Timah.
Piston.	Tăras.	Melayang or Alu.
Tinder.	Umbut.	Lulup.
Tinder box.	Sarong-besi-api.	Tempat-besi-api.
Cleaning stick.	Rotan.	Rotan.

Bangka, "tin," is probably from Banea.

Tăras is the name of the wood used.

Melayang is anything used to pound with; thus the pestle used for pounding padi is called *melayang*.

Alu is a "pestle" or "pounding stick."

Umbut is simply "tinder."

Lulup, or *lulut*, also signifies "tinder," and appears to be connected with *luluh*, "in atoms."

Sarong signifies literally a "sheath" or "covering." Thus the typical Malay dress, the *sarong*, is really *sarong kain*, "cloth sarong," stockings are *sarong kaki*, "foot sarongs," a knife sheath is *sarong parong*, or *sarong kris*, and so on. It is both Dyak and Malay.

Tempat means literally "a place where anything is done or kept." Thus a bed is *tempat tidor*, "sleeping-place," a water-cask is *tempat ayer*, "water-place," and they called my butterfly-net *tempat koupu koupu*, "butterfly-place."

Rotan is, of course, what we call "rattan," schoolmaster's cane and botanist's *calamus*.

The *Cylinder* is made of a mixture of two parts of lead to one of tin. [Lead is *iimah itam*, literally "tin-black," showing that lead is a newer metal than tin to Malays and Dyaks.]

[1] There are no true Dyaks indigenous to North-east Borneo. Those we have are gutta hunters from Sarawak and Brunei.

It is cast in a bamboo mould, somewhat as lead pipes are, I believe, cast. The mould is a thin piece of bamboo, split lengthwise, on the interior of which the ornamental bands, &c., are incised. (Pl. XI, fig. 2.)

A piece of flat wood, plank by preference, has a hole made in it the size of the bore. Through this hole a rotan is pushed, which also passes through a lump of clay tempered with sand stuck on the upper surface of the plank. The rotan projects beyond the clay to a distance somewhat greater than the length of the cylinder.

The mould, bound together with split rotan, is placed centrally and vertically over the projecting rotan, thus forming a box closed below with clay, open at the top, and having a rotan in the centre. Into this the molten metal is poured. When cool the rotan is withdrawn, the mould open, and the cylinder is complete. A good mould will make three or four castings, but, as a rule, the first destroys it.

The measurements of the cylinder are:—

Length, $3\frac{1}{4}$ inches; width, $\frac{1}{2}$ inch; bore, $\frac{3}{8}$ inch.

This is an average size; larger ones do not work well, smaller ones are of no use.

The ornamentation consists essentially of a double raised moulding about a quarter of an inch from the top and bottom, with sometimes a chevron moulding beneath the upper pair of mouldings. Of course the details vary with the taste and skill of the maker, but I can only describe what I have seen.

The upper mouldings are useful as well as ornamental, the groove between them keeping the cord from slipping which attaches the other pieces of apparatus.

The Piston (Pl. XI, fig. 1, *b*) is made of any hard wood, cylindrical, has a knob at the top, and is packed at the bottom for an inch with cloth to render the apparatus air-tight. The end is slightly hollowed for the reception of the tinder.

The Tinder that answers best is made from the external covering of the stem of a low palm, called by the Dyaks *apiang*. The basis *api* shows the name is due to the use made of the fluffy material which forms the tinder. I have only found this palm growing on the banks of mountain streams far in the interior. It grows about 30 feet high with the habit of a sago palm—clumpy. The leaves are about 15 feet long, the leaflets of a rough triangular shape with the apex towards the leaf-stalk, and very wrinkled. This puckering is highly characteristic, and gives the palm the appearance of having been damaged.

The stem is covered with a brown flocculent mass, quite soft. This is scraped off and forms the best tinder. (Pl. XI, fig. 3.)

The *Tinder-box* is a joint of bamboo about an inch thick and two to three inches long. It is ornamented according to the taste and skill of the owner in leisure moments.

The *Cleaning-stick* is simply a piece of rotan, and this and the tinder-box are attached to the syringe by threads.

To use the syringe a small piece of tinder is placed in the hollowed end of the piston, which is inserted in the mouth of the cylinder. Holding the cylinder in the left hand the knob of the piston is smartly struck with the open right hand, with sufficient force to drive the piston home. The piston is instantly and quickly withdrawn, and the tinder is seen to be alight.[1] Gently breathing on the spark it spreads, fresh tinder is applied, which catches fire immediately; more blowing increases the fire, and first scraped wood and then small sticks catch alight, and a fire is produced.

It looks very easy, but I never succeeded, though my son, Mr. E. F. Skertchly, did. The piston soon gets out of order if the packing is not attended to.

III.—Fire Drill. (Pl. XI, fig. 4.)

This well-known method of fire-making is common to all the natives in this part of Borneo, Malays, Dyaks, Dusuns, Bajows, Cagayaus, Sulus, Muruts, Cagayau-sulus, Bugis, &c., but it is getting rare to find a *young* man who knows how to work it, though they soon learn.

Only three kinds of wood are used as drills in this part of Borneo, none of which, unfortunately, have I yet been able to identify by flowers or fruit. In all cases the wood is light, even-grained, soft and friable. The commonest is a small rapid-growing tree with huge rhubarb-like leaves. It is called by the Cagayau-sulus *ladang*,[2] as is the tree from whose wood the Japanese make shoe-soles. It starts up anywhere after the forest is felled, and grows twenty feet in the first year. Its extreme height is about thirty feet. The specimens sent home are of this wood. It is a short-lived tree, and it is from the dead trees the wood is taken for fire-making, though that from living trees does as well if thoroughly dried.

The description of fire-making in Australia by Captain Cook, as quoted by Tylor,[3] is very exact, but there are one or two

[1] I have never seen tinder "burst into flame," as we sometimes read about. No tinder known to me could perform such a feat. It can only smoulder.

[2] Ladang means quick-growing. The tree is also called *penembang*.

[3] "Early Hist. Mank.," p. 238.

points either omitted or not applicable to the Australian method.

The drill (*a*) is a round stick about a foot long, tapering from a quarter to an eighth of an inch. The thicker end is slightly rounded.

The fire-wood (*b*), as the other piece may be called, since from it the fire is obtained, is of the same white *ladany* wood, about $14 \times 0{\cdot}75 \times 0{\cdot}25$ inches, roughly squared on all faces. This must not have any flaw in it.

The first operation is to cut a notch or groove down the side, for the dust to fall through. This is not mentioned by Captain Cook, but is always done, and indeed is necessary, as the dust which falls in a little heap on the ground below the hot drill, would otherwise accumulate round the drill on the top of the fire-wood, and be scarcely heated.

The operator sits on the ground and holds the fire-wood steady with both feet. Then taking the thin end of the drill between the palms of his outstretched hands he plants the rounded thick end a little on one side of the centre of the fire-wood towards the groove, applying considerable pressure.

He then works his hands backwards and forwards, keeping up the pressure, and moving the hands steadily downwards. Arrived at the bottom the hands are slid up again and the process repeated. During the upward motion of the hands the drill is still. At first the motion is slow, about one remove per second. The friction begins to wear a hollow in the fire-wood, and the dust falls down the groove in a little heap.

If the wood be in good condition, the dust, which is the tinder, begins to smoke in about twelve strokes (*i.e.*, twelve removes of the hand upwards). The motion then becomes gradually quicker and quicker till it is very fast, and I have often seen fire got in a hundred strokes within a minute. The usual time is about two minutes, but it may be five or ten if the wood be damp, of bad quality, or the operator unskilful.

As soon as fire is got the spark is gently blown, and the glowing tinder fed with shaved wood till a flame is obtained, blowing being continued all the time.

The drill wears but little, and becomes hard and charred at the end. The fire-wood is usually bored about half-way through before fire is got. The same hole can sometimes be used twice. The holes are charred in the process.

IV.—The Fire-saw. (Pl. XI, fig. 5.)

This was a favourite method of fire-making by Pandeka, a Cagayau-sulu, and is quick and effective. There are two varieties of fire-saw, but in both the apparatus is alike and simple.

In the first method two pieces of dry bamboo are taken, one of which may be called the saw, the other the horse.

The saw is a piece split from a large bamboo about 9 inches long and one and a half inches wide. In the centre of the outside a fine notch is cut across the saw deep enough to just cut through the central part. The outside is then scraped into fine shavings which are put over the hole for tinder. A few larger shreds are roughly torn up from the inside, but not disconnected from the bamboo, and are bent over the tinder to hold it in place.

The horse is a similar piece of bamboo, somewhat longer than the saw, and having one edge sharpened.

To use it the operator sits on the ground, fixes the horse firmly in front of and sloping from him, and takes the saw in both hands, curved side down, tinder uppermost, one hand at each side.

Applying strong pressure he places the notch on the sharp edge of the horse, and steadily works the saw to and from him. In about ten strokes the tinder begins to smoke, the sawing becomes more and more rapid and finally very fast, and the tinder is aglow. Lifting the saw he blows through the hole from the curved side on to the tinder, which is soon all smouldering, and fire is got in the usual way. The usual time is under a minute. I have seen the operation completed in sixty strokes.

This is the common method in Cagayau-sulu.

The second method, in use in Sulu and the native states, Perak, Selangore, &c., is simply a reversal of the process. The sharp-edged bamboo becomes the saw, the tinder-bearing bamboo the horse. The tinder-laden bamboo is fixed curved side uppermost, and the sharp-edged bamboo worked in the notch with a saw-like motion. It is equally effective with the other method, but, I think, not quite so rapid, as a greater pressure can be got with both hands than by one.

Both saw and horse become charred. The sharp-edged bamboo is worn down into a curve, and the notch in the other deepened in both methods.

V.—Fire from Bamboo and Pottery.

Pandeka, who is most skilful as a fire-maker, often amused me by striking fire with a bit of broken crockery on a bamboo.

He holds a long bamboo nearly upright, and taking a little of the scraped inside of bamboo in the hollow of his hand, and the crock between finger and thumb, he strikes a spark from the siliceous coating of the bamboo by one free stroke of the arm. It requires a good hard, seasoned bamboo to work well.

Description of Plate XI.

Apparatus for fire-making in North Borneo; collected by Mr. Skertchly, and presented to the Anthropological Museum of the University of Oxford.

Fig. 1. Fire-syringe, or *besi api*, complete with appendages. *a*. Cylinder with piston; *b*. Piston, removed from cylinder; *c*. Tinder-box; *d*. Cleaning stick.
Fig. 2. Half of the bamboo-mould, in which the cylinder of the fire-syringe is cast.
Fig. 3. Piece of *apiang* wood, from which the tinder is made.
Fig. 4. Fire drill. *a*. Drill; *b*. Firewood.
Fig. 5. Fire-saw with horse.

The paper was accompanied by a series of photographs taken by Mrs. Skertchly, showing the methods of obtaining fire from the instruments described above.

DISCUSSION.

Prof. A. C. HADDON pointed out that the slot cut in the drill-hole, referred to by Mr. Skertchly, was not made by the Torres Straits Islanders nor by the natives of Queensland, and is therefore not essential to the process. In North Queensland a short sheath is made of bark, covered with beeswax and ornamented with red seeds and the yellow skin of an orchid, in order to protect the ends of the fire-sticks from damp. In the case of the two fire-sticks being made of the same kind of wood, a difference in hardness would be obtained by the grain of the wood in the one piece being at right angles to that of the other.

Mr. A. L. LEWIS, referring to the survival of ancient modes of producing fire, remarked that he had a tinder box, flint, and steel, which were used up to 1870 by an old man in Epping Forest, who resolutely declined to allow any matches to enter his house.

Dr. J. RAE, on being asked by the Chairman to give some account of the mode of getting fire employed in use among the Eskimos, mentioned two plans he had seen used. The first of these was at Repulse Bay, and consisted of a small bundle of grass in the form of a bird's nest, about three inches in diameter, the cavity being very shallow—the outside grass was tough and rough, but gradually became finer and finer as it reached the

centre, where some wild cotton was added, and also some dried particles of decayed wood. By striking two pieces of iron pyrites over this, the sparks ignited the finer parts. He supplied these good people with some ordinary matches, also with some old-fashioned water-tight tinder boxes filled with burnt rags, flint and steel, and brimstone matches, used still very much by the Hudson's Bay Company's Voyageurs whilst travelling either in winter or summer, both to light their pipes or a fire. The other form of fire-producer obtained on Wollaston Land, and consisted of a piece of very much decayed willow or poplar eight inches long and two inches in diameter. The drill in this apparatus is fourteen inches long, five-eighths of an inch in diameter at one end, a quarter of an inch at the other or upper end, which fits into a stone socket, fitted into a wooden mouth-piece to make it more easily held in the teeth—a strong thong of stout seal skin completes the apparatus. In use, the piece of two-inch diameter is held between the knees, the mouth-piece is firmly held in the teeth, the thickest end of the drill placed in one of the grooves, if it is a new piece of wood not previously used, or if previously used into a hole already worn out; then the small end of the drill is placed in the socket of the mouth, and the drill is set in rapid motion by the skin thong which has been placed round it, and worked with both hands.

Mr. E. BIDWELL exhibited and described several fire-syringes in illustration of Mr. Skertchly's descriptions.

Mr. R. PRITCHETT sent for exhibition some full-sized drawings of fire syringes which he had made during the last voyage of the late Lady Brassey in the *Sunbeam*.

The Secretary read the following Paper:—

On a SAFE CONCLUSION *concerning the* ORIGIN *of the* ESKIMO, *which can be drawn from the designation of certain objects in their language.* By Dr. H. RINK, of Copenhagen.

IN an earlier paper in the Anthropological Institute's Journal,[1] I have endeavoured to give a summary of the Eskimo language and the mutual relation of its dialects in general. In prosecuting the same linguistic study I have been led to a conclusion concerning the different theories on the origin of the Eskimo which I suppose may at least serve to restrict the number of possibilities that this obscure field of research offers

[1] "Journ. Anthrop. Inst.," vol. xv, No. 2, 1885, p. 239.